UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/941,476	08/29/2001	John Whitman	303.254US4	6686

21186 7590 04/09/2003

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

EXAMINER
KOCH, GEORGE R

ART UNIT	PAPER NUMBER
1734	13

DATE MAILED: 04/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/941,476	WHITMAN, JOHN	
	Examiner	Art Unit	
	George R. Koch III	1734	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 January 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *13-22,24-29,31-33,35-39,41,42,44-48 and 50-61* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-22,24-29,31-33,35-39,41,42,44-48 and 50-61* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 January 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Drawings

1. The corrected or substitute drawings were received on 1-27-2003. These drawings are approved.

Claim Rejections - 35 USC § 102

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 13, 15 – 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orth (USPN 5,750,317) in view of Gordon (USPN 5,066,616) and Yoda et al. (USPN 5,876,882).

Orth discloses an apparatus comprising: a solvent dispense head in fluid communication with a source of photoresist and solvent, a rotatable wafer-holding mechanism, a logic control unit that executes the process of distributing solvent and photoresist on the wafer surface (See Figs. 6 – 7, items 22, 8, 10, 4, 6). Orth teaches to distribute solvent after the photoresist, but also suggests other methods may be employed by the logic control unit (See Fig. 3 and Col. 5, line 44). One in the art would

appreciate distributing solvent before the photoresist in order to prevent mottling by providing a uniform coating of photoresist and reduce the sensitivity of the photoresist to minor changes in conditions. It is known and conventional to distribute solvent prior to photoresist on a wafer as shown, for example, by Gordon (See Col. 3, lines 20 – 40, 3 – 8). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process executed by the logic control unit of Orth to distribute the solvent prior to the photoresist in order to provide a uniform coating of photoresist on the wafer and reduce the sensitivity of the photoresist to minor changes in conditions as is taught and suggested by Gordon. Orth is capable of dispensing the ranges and types of solvents claimed (namely, diacetone alcohol and aliphatic ester herein the ratio of the diacetone alcohol and aliphatic ester range between 10% ester and 90% alcohol to 30% ester and 70% alcohol).

Orth is also silent to the source of solvent containing a solvent that includes diacetone alcohol. Gordon teaches that the solvent distributed by the apparatus is the same solvent used to prepare the photoresist (See Col. 5, lines 48 – 50 and Col. 6, lines 42-43, 55-56). However, Gordon does not expressly teach or suggest diacetone alcohol. One in the art would appreciate diacetone alcohol is a well known and conventional solvent used in the preparation of photoresist. It is well known and conventional to use diacetone alcohol as the solvent in photoresist as shown, for example, by Yoda et al. (See Col. 7, lines 21-22, 33-34). It would have been obvious to one of ordinary skill in the art at the time of the invention to supply diacetone alcohol to the dispense head of Orth as is a well known and conventional solvent for photoresists

as shown by Yoda et al. It is noted that one in the art choosing diacetone alcohol to prepare the photoresist would also choose the same in order to obtain the advantages disclosed by Gordon – no unexpected results are achieved.

Regarding claims 19 and 20, Orth discloses an apparatus comprising: a solvent dispense head in fluid communication with a source of photoresist and solvent, a rotatable wafer-holding mechanism, a logic control unit that executes the process of distributing solvent and photoresist on the wafer surface (See Figs. 6 – 7, items 22, 8, 10, 4, 6). Orth teaches to dispense solvent and actuate the holding mechanism after the photoresist is dispensed and rotated, but also suggests other methods may be employed by the logic control unit (See Fig. 3 and Col. 5, line 44). One in the art would appreciate distributing solvent before the photoresist in order to prevent mottling by providing a uniform coating of photoresist and reduce the sensitivity of the photoresist to minor changes in conditions. It is known and conventional to distribute solvent prior to photoresist on a wafer as shown, for example, by Gordon (See Col. 3, lines 20 – 40, 3 – 8). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process executed by the logic control unit of Orth to distribute the solvent prior to the photoresist in order to provide a uniform coating of photoresist on the wafer and reduce the sensitivity of the photoresist to minor changes in conditions as is taught and suggested by Gordon. Orth is capable of dispensing the ranges and types of solvents claimed (namely, diacetone alcohol and aliphatic ester herein the ratio of the diacetone alcohol and aliphatic ester range between 10% ester and 90% alcohol to 30% ester and 70% alcohol).

Orth is also silent to the source of solvent containing a solvent that includes diacetone alcohol and aliphatic esther. Gordon teaches that the solvent distributed by the apparatus is the same solvent used to prepare the photoresist (See Col. 5, lines 48 – 50 and Col. 6, lines 42-43, 55-56). However, Gordon does not expressly teach or suggest diacetone alcohol and aliphatic esther. One in the art would appreciate diacetone alcohol and aliphatic esther are well known and conventional solvents used in the preparation of photoresist. It is well known and conventional to use diacetone alcohol and aliphatic esther as the solvent in photoresist as shown, for example, by Yoda et al. (See Col. 7, lines 21-22, 33-34, 36, 39). It would have been obvious to one of ordinary skill in the art at the time of the invention to supply diacetone alcohol and aliphatic esther to the dispense head of Orth as is a well known and conventional solvent for photoresists as shown by Yoda et al. It is noted that one in the art choosing diacetone alcohol and aliphatic esther to prepare the photoresist would also choose the same in order to obtain the advantages disclosed by Gordon – no unexpected results are achieved.

Regarding claims 15 and 16, Gordon discloses the claimed method steps (See Col. 3, lines 20 – 40).

Regarding claim 17, Orth discloses the claimed method steps (See Fig. 2).

Regarding claim 18, Gordon teaches the solvents are the same (See Col. 6, lines 43, 56).

5. Claims 14 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Orth, Gordon and Yoda as applied to claims 13 and 19 above, and further in

view of Hayes et al. (USPN 5,849,084). Orth discloses two nozzles, one for photoresist the other for solvent. One in the art would appreciate a second photoresist nozzle in order to provide proper coverage of the wafer, especially with the art generally moving to increase wafer dimensions. It is known and conventional to provide a third nozzle for the dispensing of photoresist as shown, for example, by Hayes et al. (See Col. 3, lines 35 – 40, 60 – 64 and Col. 6, lines 40 – 45). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide Orth with another photoresist nozzle in order to properly cover the entire surface of the wafer with photoresist as is taught and suggested by Hayes et al.

6. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Orth, Gordon and Yoda as applied to claims 19 above, and further in view of the admitted prior art (Figure 1, and page 9, lines 9-19). Orth discloses two nozzles, one for photoresist the other for solvent. Both nozzles are capable of dispensing towards the center of the top surface of the wafer, due to the nozzle movement capabilities. Orth, Gordon and Yoda as applied to claim 19 above do disclose a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer. The admitted prior art of Figure 1 and page 9, lines 9-19 of the specification, discloses a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer, in order to ensure edge bead removal and wafer cleaning. in order to provide proper coverage of the wafer, especially with the art generally moving to increase wafer dimensions. One in the art would appreciate that these extra nozzles

improve the yield of the wafer processing system, by improving the cleanliness of the wafer. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have included in a device such as that of Orth, Gordon and Yoda, a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer as in the admitted prior art in order to improve the overall yield of the wafer processing system. Furthermore, the logic system of Orth, Gordon and Yoda is consider capable of performing the steps claimed.

7. Claims 24, 26 – 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orth in view of Gordon, Yoda et al. and the admitted prior art.

Orth discloses an apparatus comprising: a solvent dispense head in fluid communication with a source of photoresist and solvent, a rotatable wafer-holding mechanism, a logic control unit that executes the process of distributing solvent and photoresist on the wafer surface (See Figs. 6 – 7, items 22, 8, 10, 4, 6). Orth teaches to distribute solvent after the photoresist, but also suggests other methods may be employed by the logic control unit (See Fig. 3 and Col. 5, line 44). One in the art would appreciate distributing solvent before the photoresist in order to prevent mottling by providing a uniform coating of photoresist and reduce the sensitivity of the photoresist to minor changes in conditions. It is known and conventional to distribute solvent prior to photoresist on a wafer as shown, for example, by Gordon (See Col. 3, lines 20 – 40, 3 – 8). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process executed by the logic control unit of Orth to distribute the solvent prior to the photoresist in order to provide a uniform coating of photoresist

on the wafer and reduce the sensitivity of the photoresist to minor changes in conditions as is taught and suggested by Gordon.

Orth discloses two nozzles, one for photoresist the other for solvent. Both nozzles are capable of dispensing towards the center of the top surface of the wafer, due to the nozzle movement capabilities. Orth, Gordon and Yoda as applied to claim 19 above do not disclose a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer.

The admitted prior art of Figure 1 and page 9, lines 9-19 of the specification, discloses a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer, in order to ensure edge bead removal and wafer cleaning. in order to provide proper coverage of the wafer, especially with the art generally moving to increase wafer dimensions. One in the art would appreciate that these extra nozzles improve the yield of the wafer processing system, by improving the cleanliness of the wafer. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have included in a device such as that of Orth, Gordon and Yoda, a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer as in the admitted prior art in order to improve the overall yield of the wafer processing system. Furthermore, the logic system of Orth is consider capable of performing the steps claimed.

Orth is also silent to the source of solvent containing a solvent that includes diacetone alcohol. Gordon teaches that the solvent distributed by the apparatus is the same solvent used to prepare the photoresist (See Col. 5, lines 48 – 50 and Col. 6, lines

42-43, 55-56). However, Gordon does not expressly teach or suggest diacetone alcohol. One in the art would appreciate diacetone alcohol is a well known and conventional solvent used in the preparation of photoresist. It is well known and conventional to use diacetone alcohol as the solvent in photoresist as shown, for example, by Yoda et al. (See Col. 7, lines 21-22, 33-34). It would have been obvious to one of ordinary skill in the art at the time of the invention to supply diacetone alcohol to the dispense head of Orth as is a well known and conventional solvent for photoresists as shown by Yoda et al. It is noted that one in the art choosing diacetone alcohol to prepare the photoresist would also choose the same in order to obtain the advantages disclosed by Gordon – no unexpected results are achieved.

8. Claims 28 – 29, 31, 37, 41 and 58 – 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orth in view of Gordon, Yoda et al., Hasebe et al. (USPN 5,658,615) and the admitted prior art.

As to claim 28, Orth discloses an apparatus comprising: a solvent dispense head in fluid communication with a source of photoresist and solvent, a rotatable base, a logic control unit that executes the process of distributing solvent and photoresist on the wafer surface (See Figs. 6 – 7, items 22, 8, 10, 4, 6). Orth teaches to distribute solvent after the photoresist, but also suggests other methods may be employed by the logic control unit (See Fig. 3 and Col. 5, line 44). One in the art would appreciate distributing solvent before the photoresist in order to prevent mottling by providing a uniform coating of photoresist and reduce the sensitivity of the photoresist to minor changes in

conditions. It is known and conventional to distribute solvent prior to photoresist on a wafer as shown, for example, by Gordon (See Col. 3, lines 20 – 40, 3 – 8). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process executed by the logic control unit of Orth to distribute the solvent prior to the photoresist in order to provide a uniform coating of photoresist on the wafer and reduce the sensitivity of the photoresist to minor changes in conditions as is taught and suggested by Gordon.

Orth discloses two nozzles, one for photoresist the other for solvent. Both nozzles are capable of dispensing towards the center of the top surface of the wafer, due to the nozzle movement capabilities. Orth, Gordon and Yoda as applied to claim 19 above do not disclose a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer.

The admitted prior art of Figure 1 and page 9, lines 9-19 of the specification, discloses a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer, in order to ensure edge bead removal and wafer cleaning. in order to provide proper coverage of the wafer, especially with the art generally moving to increase wafer dimensions. One in the art would appreciate that these extra nozzles improve the yield of the wafer processing system, by improving the cleanliness of the wafer. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have included in a device such as that of Orth, Gordon and Yoda, a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer as in the admitted prior art in order to improve the overall

yield of the wafer processing system. Furthermore, the logic system of Orth, Gordon and Yoda is consider capable of performing the steps claimed.

Orth is also silent to the source of solvent containing a solvent that includes diacetone alcohol. Gordon teaches that the solvent distributed by the apparatus is the same solvent used to prepare the photoresist (See Col. 5, lines 48 – 50 and Col. 6, lines 42-43, 55-56). However, Gordon does not expressly teach or suggest diacetone alcohol. One in the art would appreciate diacetone alcohol is a well known and conventional solvent used in the preparation of photoresist. It is well known and conventional to use diacetone alcohol as the solvent in photoresist as shown, for example, by Yoda et al. (See Col. 7, lines 21-22, 33-34). It would have been obvious to one of ordinary skill in the art at the time of the invention to supply diacetone alcohol to the dispense head of Orth as is a well known and conventional solvent for photoresists as shown by Yoda et al. It is noted that one in the art choosing diacetone alcohol to prepare the photoresist would also choose the same in order to obtain the advantages disclosed by Gordon – no unexpected results are achieved.

Orth is also silent to solenoids that control the flow of photoresist and solvent. One in the art would appreciate solenoids are well known and conventionally employed to control the flows of liquid supply as shown, for example, by Hasebe et al. (See Col. 4, lines 42 – 47, Col. 5, lines 46 – 48, 58 – 61 and Col. 6, lines 6 – 14). It would have been obvious to one of ordinary skill in the art at the time of the invention to include solenoids in Orth to control the flows of the photoresist and solvent supplied to the discharge head as is taught and suggested by Hasebe et al.

Regarding claim 37, the references are applied for the same reasons set forth in the discussion of claim 28 above. The nozzle is capable of dispensing solvent for edge bead removal and wafer cleaning.

As to claims 38, 39 and 41, the system of claim 37 is capable of dispensing the claimed solutions.

Regarding claim 58, Orth discloses an apparatus comprising: a track coating unit coupled to a source of solvent having a solvent dispense head, a rotatable base, a logic control unit that executes the process of distributing solvent and photoresist on the wafer surface, and dispensing solvent on the edges and sides of the wafer for edge bead removal (See Figs. 2, 6 – 7, items 22, 8, 10, 4, 6). Orth teaches to distribute solvent after the photoresist, but also suggests other methods may be employed by the logic control unit (See Fig. 3 and Col. 5, line 44). One in the art would appreciate distributing solvent before the photoresist in order to prevent mottling by providing a uniform coating of photoresist and reduce the sensitivity of the photoresist to minor changes in conditions. It is known and conventional to distribute solvent prior to photoresist on a wafer as shown, for example, by Gordon (See Col. 3, lines 20 – 40, 3 – 8). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process executed by the logic control unit of Orth to distribute the solvent prior to the photoresist in order to provide a uniform coating of photoresist on the wafer and reduce the sensitivity of the photoresist to minor changes in conditions as is taught and suggested by Gordon.

Orth discloses two nozzles, one for photoresist the other for solvent. Both nozzles are capable of dispensing towards the center of the top surface of the wafer, due to the nozzle movement capabilities. Orth, Gordon and Yoda as applied to claim 19 above do not disclose a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer.

The admitted prior art of Figure 1 and page 9, lines 9-19 of the specification, discloses a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer, in order to ensure edge bead removal and wafer cleaning. in order to provide proper coverage of the wafer, especially with the art generally moving to increase wafer dimensions. One in the art would appreciate that these extra nozzles improve the yield of the wafer processing system, by improving the cleanliness of the wafer. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have included in a device such as that of Orth, Gordon and Yoda, a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer as in the admitted prior art in order to improve the overall yield of the wafer processing system. Furthermore, the logic system of Orth, Gordon and Yoda is consider capable of performing the steps claimed.

Orth is also silent to the bulk solvent that includes diacetone alcohol. Gordon teaches that the solvent distributed by the apparatus is the same solvent used to prepare the photoresist (See Col. 5, lines 48 – 50 and Col. 6, lines 42-43, 55-56). However, Gordon does not expressly teach or suggest diacetone alcohol. One in the art would appreciate diacetone alcohol is a well known and conventional solvent used in

the preparation of photoresist. It is well known and conventional to use diacetone alcohol as the solvent in photoresist as shown, for example, by Yoda et al. (See Col. 7, lines 21-22, 33-34). It would have been obvious to one of ordinary skill in the art at the time of the invention to supply diacetone alcohol to the dispense head of Orth as is a well known and conventional solvent for photoresists as shown by Yoda et al. It is noted that one in the art choosing diacetone alcohol to prepare the photoresist would also choose the same in order to obtain the advantages disclosed by Gordon – no unexpected results are achieved.

Orth is silent to a bulk solvent container. One in the art would appreciate a container holds the solvent to be supplied to the solvent dispense head. It is well known and conventional to provide a bulk solvent container as shown, for example, by Hasebe et al. (See Fig. 1, item 7b). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide Orth with a bulk solvent container as is well known and conventional in the art when supplying a solvent to a dispense head as is taught and suggested by Hasebe et al.

Regarding claim 59, Orth is also silent to solenoids that control the flow of photoresist and solvent. One in the art would appreciate solenoids are well known and conventionally employed to control the flows of liquid supply as shown, for example, by Hasebe et al. (See Col. 4, lines 42 – 47, Col. 5, lines 46 – 48, 58 – 61 and Col. 6, lines 6 – 14). It would have been obvious to one of ordinary skill in the art at the time of the invention to include solenoids in Orth to control the flows of the photoresist and solvent supplied to the discharge head as is taught and suggested by Hasebe et al.

Regarding claim 60, Yoda et al. teaches an aliphatic esther may also be used as the solvent with the diacetone alcohol (See Col. 7, lines 33 – 39).

Regarding claims 29 and 41, Gordon teaches the solvents are the same (See Col. 6, lines 43, 56).

Regarding claim 31, Orth discloses the claimed method steps (See Fig. 2).

9. Claims 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Orth in view of Gordon, Yoda et al., and Hasebe et al. (USPN 5,658,615)

Orth discloses an apparatus comprising: a solvent dispense head in fluid communication with a source of photoresist and a bulk solvent, a rotatable base, a logic control unit that executes the process of distributing solvent and photoresist on the wafer surface (See Figs. 6 – 7, items 22, 8, 10, 4, 6). Orth teaches to distribute solvent after the photoresist, but also suggests other methods may be employed by the logic control unit (See Fig. 3 and Col. 5, line 44). One in the art would appreciate distributing solvent before the photoresist in order to prevent mottling by providing a uniform coating of photoresist and reduce the sensitivity of the photoresist to minor changes in conditions. It is known and conventional to distribute solvent prior to photoresist on a wafer as shown, for example, by Gordon (See Col. 3, lines 20 – 40, 3 – 8). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process executed by the logic control unit of Orth to distribute the solvent prior to the photoresist in order to provide a uniform coating of photoresist on the wafer and reduce

the sensitivity of the photoresist to minor changes in conditions as is taught and suggested by Gordon.

Orth is also silent to the source of bulk solvent containing the bulk solvent that includes diacetone alcohol and aliphatic esther. Gordon teaches that the solvent distributed by the apparatus is the same solvent used to prepare the photoresist (See Col. 5, lines 48 – 50 and Col. 6, lines 42-43, 55-56). However, Gordon does not expressly teach or suggest diacetone alcohol and aliphatic esther. One in the art would appreciate diacetone alcohol and aliphatic esther are well known and conventional solvents used in the preparation of photoresist. It is well known and conventional to use diacetone alcohol and aliphatic esther as the solvent in photoresist as shown, for example, by Yoda et al. (See Col. 7, lines 21-22, 33-34, 36, 39). It would have been obvious to one of ordinary skill in the art at the time of the invention to supply diacetone alcohol and aliphatic esther to the dispense head of Orth as is a well known and conventional solvent for photoresists as shown by Yoda et al. It is noted that one in the art choosing diacetone alcohol and aliphatic esther to prepare the photoresist would also choose the same in order to obtain the advantages disclosed by Gordon – no unexpected results are achieved. Furthermore, Orth is capable of dispensing any of the claimed solutions. Orth is capable of dispensing the ranges and types of solvents claimed (namely, diacetone alcohol and aliphatic ester herein the ratio of the diacetone alcohol and aliphatic ester range between 10% ester and 90% alcohol to 30% ester and 70% alcohol).

Orth is also silent to solenoids that control the flow of photoresist and solvent. One in the art would appreciate solenoids are well known and conventionally employed to control the flows of liquid supply as shown, for example, by Hasebe et al. (See Col. 4, lines 42 – 47, Col. 5, lines 46 – 48, 58 – 61 and Col. 6, lines 6 – 14). It would have been obvious to one of ordinary skill in the art at the time of the invention to include solenoids in Orth to control the flows of the photoresist and solvent supplied to the discharge head as is taught and suggested by Hasebe et al.

10. Claims 32-33, 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orth in view of Gordon, Yoda et al., the admitted prior art and Hasebe et al. Orth discloses an apparatus comprising: a solvent dispense head in fluid communication with a source of photoresist and solvent, a rotatable wafer-holding mechanism, a logic control unit that executes the process of distributing solvent and photoresist on the wafer surface (See Figs. 6 – 7, items 22, 8, 10, 4, 6). Orth teaches to distribute solvent after the photoresist, but also suggests other methods may be employed by the logic control unit (See Fig. 3 and Col. 5, line 44). One in the art would appreciate distributing solvent before the photoresist in order to prevent mottling by providing a uniform coating of photoresist and reduce the sensitivity of the photoresist to minor changes in conditions. It is known and conventional to distribute solvent prior to photoresist on a wafer as shown, for example, by Gordon (See Col. 3, lines 20 – 40, 3 – 8). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process executed by the logic control unit of Orth to distribute the solvent prior to the

photoresist in order to provide a uniform coating of photoresist on the wafer and reduce the sensitivity of the photoresist to minor changes in conditions as is taught and suggested by Gordon.

Orth is also silent to the source of solvent containing a solvent that includes diacetone alcohol. Gordon teaches that the solvent distributed by the apparatus is the same solvent used to prepare the photoresist (See Col. 5, lines 48 – 50 and Col. 6, lines 42-43, 55-56). However, Gordon does not expressly teach or suggest diacetone alcohol. One in the art would appreciate diacetone alcohol is a well known and conventional solvent used in the preparation of photoresist. It is well known and conventional to use diacetone alcohol as the solvent in photoresist as shown, for example, by Yoda et al. (See Col. 7, lines 21-22, 33-34). It would have been obvious to one of ordinary skill in the art at the time of the invention to supply diacetone alcohol to the dispense head of Orth as is a well known and conventional solvent for photoresists as shown by Yoda et al. It is noted that one in the art choosing diacetone alcohol to prepare the photoresist would also choose the same in order to obtain the advantages disclosed by Gordon – no unexpected results are achieved.

Orth discloses two nozzles, one for photoresist the other for solvent. Both nozzles are capable of dispensing towards the center of the top surface of the wafer, due to the nozzle movement capabilities. Orth, Gordon and Yoda as applied above do not disclose a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer.

The admitted prior art of Figure 1 and page 9, lines 9-19 of the specification, discloses a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer, in order to ensure edge bead removal and wafer cleaning. in order to provide proper coverage of the wafer, especially with the art generally moving to increase wafer dimensions. One in the art would appreciate that these extra nozzles improve the yield of the wafer processing system, by improving the cleanliness of the wafer. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have included in a device such as that of Orth, Gordon and Yoda, a nozzle directed at the back of the wafer and another nozzle directed at the edge and sides of the wafer as in the admitted prior art in order to improve the overall yield of the wafer processing system. Furthermore, the logic system of Orth, Gordon and Yoda is consider capable of performing the steps claimed.

Orth is also silent to solenoids that control the flow of photoresist and solvent. One in the art would appreciate solenoids are well known and conventionally employed to control the flows of liquid supply as shown, for example, by Hasebe et al. (See Col. 4, lines 42 – 47, Col. 5, lines 46 – 48, 58 – 61 and Col. 6, lines 6 – 14). It would have been obvious to one of ordinary skill in the art at the time of the invention to include solenoids in Orth to control the flows of the photoresist and solvent supplied to the discharge head as is taught and suggested by Hasebe et al.

11. Claims 25 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Orth, Gordon, Yoda and the admitted prior art as applied to claim 24 above and Orth, Gordon, Yoda, the admitted prior art and Hasebe applied to claim 32 above, and

further in view of Ikeno et al. (USPN 4,886,012). Regarding claim 25, Orth is silent to the first and second nozzles in fluid communication with the solvent source. One in the art would appreciate the increased flexibility of the nozzles having a dual function. It is known and conventional to connect nozzles to both a solvent source and photoresist source as shown, for example, by Ikeno et al. (See Figs. 3-4 and Col. 5, lines 10 – 68). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the first and second nozzles of Orth to be in fluid communication with the solvent source as shown by Ikeno in order to increase the flexibility and functionality of the apparatus.

Regarding claim 35, the prior art discloses that the solvent supplied and the solvent of the photoresist are the same, but does not teach that the source is from a common bulk solvent. One in the art would appreciate a common bulk solvent is used in order to simplify the apparatus. It is known and conventional to provide a single bulk solvent source as shown, by Ikeno et al. (See Fig. 3, items 18, 19). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide a common bulk solvent to Orth in order to simplify the apparatus and decrease the amount of space required for the apparatus.

12. Claims 13-22, 24-29, 31-33, 35-39, and 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (of Figures 1 and 2, and specification, page 9, lines 9-25, also referred to as "APA") and Orth (USPN 5,750,317).

As to claim 13, the admitted prior art discloses a apparatus comprising a solvent dispense head in fluid communications with a source of photoresist solution and a source of solvent and a logic control unit capable of executing the process claimed (see Figure 1 and 2, and specification page 9, lines 9-25). The admitted prior art discloses that the source of the photoresist and the solvent is a common bulk solvent source.

The admitted prior art discloses a spinning operation, but does not disclose the specifics of the structure for rotating and mounting the wafer. One in the art would appreciate that any conventional rotating structure could be used to support and rotate the wafer. Orth discloses such a rotatable base for mounting the wafer (figure 7 - items 8, 9 and 10). Orth discloses that such rotation created by a rotatable base would allow for spreading and distribution of liquids dispensed onto the surfaces of the wafer, thus improving the regularity of the coating thickness (see abstract, column 1, lines 11-17) by reducing edgebeads and other areas of extraneous materials. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have included a rotable base for mounting the wafer as in Orth in the overall apparatus of the admitted prior art in order to improve the spreading and distribution of liquids dispensed onto the surfaces of the wafer.

As to claim 14, the admitted prior art discloses a first nozzle as claimed, directed at the top of the wafer, and a second nozzle as claimed, which happen to be directed at the back of the wafer, but does not disclose a third nozzle. Orth discloses two movable nozzles, one which is capable of being directed at the center of the wafer, and the other which is capable of being directed generally towards the top of the wafer (see Figure 7,

items 14 and 18). Both nozzles are capable of dispensing towards the center of the top surface of the wafer, due to the nozzle movement capabilities. One nozzle dispenses photoresist, the other dispense solvent. Orth does not disclose dispensing to the back of the wafer. One would appreciate that using two nozzles at the top (plus the one at the bottom already disclosed by the admitted prior art), one capable of being directed at the center of the wafer, and the other which is capable of being directed generally towards the top of the wafer allows for improved coverage and coating times. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have included a nozzle capable of being directed towards the center of the wafer in order to improve coverage and coating times.

As to claims 15, 16, and 17, the logic control unit as created and used by the combined admitted prior art and Orth references, is capable of perform the additional steps claimed.

As to claim 18, the admitted prior art and Orth are capable of using the claimed solutions.

Claim 19 is rejected on similar grounds as claim 13. The admitted prior art is capable of dispensing the ranges and types of solvents claimed (namely, diacetone alcohol and aliphatic ester herein the ratio of the diacetone alcohol and aliphatic ester range between 10% ester and 90% alcohol to 30% ester and 70% alcohol), or any other range. The logic control unit is capable of being adapted to perform the steps claimed.

As to claim 20, the admitted prior art discloses that the solvent dispense head includes a nozzle in fluid communication with the solvent source. The logic control unit is capable of being adapted to perform the steps claimed.

As to claim 21, see the rejections of claim 14 and 13 above.

As to claim 22, see the rejections of claim 14 and 13 above. The orientation and position of the nozzles in claim 22 correspond to the orientation and position of the nozzles created by the combination of the admitted prior art and Orth, i.e., a first nozzle directed at a wafer edge and side, connected to the photoresist source (from the APA), a second nozzle directed at a wafer back surface, connected to a wafer back surface (also from the APA), and a third nozzle directed towards the center of the wafer, connected to the solvent source (as disclosed by Orth). The admitted prior art is capable of dispensing the ranges and types of solvents claimed (namely, diacetone alcohol and aliphatic ester in any other range. The logic control unit is capable of being adapted to perform the steps claimed.

As to claim 24, see the rejections of claim 14 and 13 above. The orientation and position of the nozzles in claim 24 correspond to the orientation and position of the nozzles created by the combination of the admitted prior art and Orth, i.e., a first nozzle directed at a wafer edge and side, connected to the photoresist source (from the APA), a second nozzle directed at a wafer back surface, connected to a wafer back surface (also from the APA), and a third nozzle directed towards the center of the wafer, connected to the solvent source (as disclosed by Orth). The admitted prior art is capable of dispensing the ranges and types of solvents claimed (namely, diacetone

alcohol and aliphatic ester in any other range. The logic control unit is capable of being adapted to perform the steps claimed.

As to claim 25, the admitted prior art discloses connecting the first and second nozzles to the solvent source as well (see especially page 9 of the specification, columns 20-25).

As to claims 26 and 27, the apparatus and logic control unit of the admitted prior art as modified by Orth is capable of performing the steps claimed.

As to claim 28, see the rejection of claims 14 and 13 above, which disclose the rotatable base for holding a wafer, a solvent dispense head as claimed, and a logic control unit as claimed. The orientation and position of the nozzles in claim 28 correspond to the orientation and position of the nozzles created by the combination of the admitted prior art and Orth, i.e., a first nozzle directed at a wafer edge and side, connected to the photoresist source (from the APA), a second nozzle directed at a wafer back surface, connected to a wafer back surface (also from the APA), and a third nozzle directed towards the center of the wafer, connected to the solvent source (as disclosed by Orth). The admitted prior art is capable of dispensing the ranges and types of solvents claimed (namely, diacetone alcohol and aliphatic ester in any other range. The logic control unit is capable of being adapted to perform the steps claimed. Furthermore, the admitted prior art also discloses solenoids for controlling the flow of photoresist solution and solvent through the solvent dispense head (see Figure 1, items 131, 132, for example).

As to claim 29, the admitted prior art and Orth are capable of using the claimed solutions.

As to claim 31, the apparatus and logic control unit of the admitted prior art as modified by Orth is capable of performing the steps claimed. It is noted that Orth is directed towards apparatus and nozzles for performing edge bead removal steps.

As to claim 32, see the rejections of claim 14 and 13 above, which cover the rotatable base for holding a wafer, a solvent dispense head as claimed, and a logic control unit as claimed. The orientation and position of the nozzles in claim 28 correspond to the orientation and position of the nozzles created by the combination of the admitted prior art and Orth, i.e., a first nozzle directed at a wafer edge and side, connected to the photoresist source (from the APA), a second nozzle directed at a wafer back surface, connected to a wafer back surface (also from the APA), and a third nozzle directed towards the center of the wafer, connected to the solvent source (as disclosed by Orth). The admitted prior art is capable of dispensing the ranges and types of solvents claimed (namely, diacetone alcohol and aliphatic ester in any other range. The logic control unit is capable of being adapted to perform the steps claimed. Furthermore, the admitted prior art also discloses solenoids for controlling through the first and second nozzle (see Figure 1, items 131, 132, for example), and one would immediately appreciate adding extra solenoids for each extra nozzle included.

As to claim 33, the rejection of claim 14 above calls for a nozzle directed towards the center of the wafer.

As to claim 35, the admitted prior art discloses that the source of the solvent and photoresist solvent are from a common bulk solvent (see figure 2, item 210).

As to claim 36, the admitted prior art and Orth are capable of using the claimed solutions.

As to claim 37, 38 and 39, see the rejections of claim 14 and 13 above, which cover the rotatable base for holding a wafer (from Orth), a solvent dispense head as claimed, and a logic control unit as claimed. Furthermore, the admitted prior art also discloses solenoids for controlling the flow through the solvent dispense head (see Figure 1, items 131, 132, for example). The admitted prior art discloses that the source of the solvent and photoresist solvent are from a common bulk solvent (see figure 2, item 210). The admitted prior art is capable of dispensing the ranges and types of solvents claimed (namely, diacetone alcohol, wherein the percentage of diacetone alcohol ranges from 70 to 90 percent of the bulk solvent). The logic control unit is capable of being adapted to perform the steps claimed.

As to claim 41, the admitted prior art and Orth are capable of using the claimed solutions.

As to claim 42, see the rejections of claim 14 and 13 above, which cover the rotatable base for holding a wafer (from Orth), a solvent dispense head as claimed, and a logic control unit as claimed. Furthermore, the admitted prior art also discloses solenoids for controlling the flow through the solvent dispense head (see Figure 1, items 131, 132, for example). The admitted prior art discloses that the source of the solvent and photoresist solvent are from a common bulk solvent (see figure 2, item 210). The

admitted prior art is capable of dispensing the ranges and types of solvents claimed (namely, diacetone alcohol and aliphatic ester herein the ratio of the diacetone alcohol and aliphatic ester range between 10% ester and 90% alcohol to 30% ester and 70% alcohol). The logic control unit is capable of being adapted to perform the steps claimed.

13. Claims 44-47, 48, 50-57, 58-60 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (of Figures 1 and 2, and specification, page 9, lines 9-25) and Orth (USPN 5,750,317).

As to claim 44, the admitted prior art discloses a system for coating a wafer comprising a bulk solvent container (item 210) capable of holding the claimed solvent, a low pressure canister connected to the bulk solvent container, and a track coating unit connected to the low pressure container, comprising a solvent dispense head and a logic control unit capable of executing the process claimed. The bulk solvent container is capable of containing any solvent, including the claimed solvent.

The admitted prior art discloses a spinning operation, but does not disclose the specifics of the structure for rotating and mounting the wafer. One in the art would appreciate that any conventional rotating structure could be used to support and rotate the wafer. Orth discloses such a rotatable base for mounting the wafer (figure 7 - items 8, 9 and 10). Orth discloses that such rotation created by a rotatable base would allow for spreading and distribution of liquids dispensed onto the surfaces of the wafer, thus improving the regularity of the coating thickness (see abstract, column 1, lines 11-17) by

reducing edgebeads and other areas of extraneous materials. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have included a rotable base for mounting the wafer as in Orth in the overall apparatus of the admitted prior art in order to improve the spreading and distribution of liquids dispensed onto the surfaces of the wafer.

As to claim 45, the apparatus of the admitted prior art and Orth is capable of dispensing the claimed solvent.

As to claim 46, the admitted prior art discloses a first nozzle as claimed, directed at the top of the wafer, and a second nozzle as claimed, directed at the back of the wafer, but does not disclose a third nozzle direct at the center of the wafer. Orth discloses two movable nozzles, one which is capable of being directed at the center of the wafer, and the other which is capable of being directed generally towards the top of the wafer (see Figure 7, items 14 and 18). . Both nozzles are capable of dispensing towards the center of the top surface of the wafer, due to the nozzle movement capabilities. One would appreciate that using two nozzles at the top (plus the one at the bottom), one capable of being directed at the center of the wafer, and the other which is capable of being directed generally towards the top of the wafer allows for improved coverage and coating times. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have included a nozzle capable of being directed towards the center of the wafer in order to improve coverage and coating times.

As to claim 47, the admitted prior art discloses that the low pressure canister is adapted to maintained a fluid pressure and a fluid level for the track coating unit (see specification page 9, lines 23-24).

As to claim 48, see the rejection of claim 46 above. The structure of claim 48 is virtually the same as the structure of claim 44, except that the intended use requires a nozzle for dispensing the bulk solvent on the center of a wafer top surface. The admitted prior art does not disclose dispensing onto the center of the top surface of the wafer, but such an improvement is obvious as disclosed by the nozzles of Orth (and applied in claim 46), which are capable of dispensing bulk solvent on the center of a wafer top surface.

As to claims 50-57, the admitted prior art is capable of dispensing the ranges and types of solvents claimed (namely, diacetone alcohol and aliphatic ester herein the ratio of the diacetone alcohol and aliphatic ester range between 10% ester and 90% alcohol to 30% ester and 70% alcohol).

As to claim 58, see the rejection of claim 46 above. The structure of claim 58 is similar to that of claim 44 and 46. The admitted prior art discloses a system for coating a wafer comprising a bulk solvent container (item 210) capable of holding the claimed solvent, a low pressure canister connected to the bulk solvent container, and a track coating unit connected to the low pressure container, comprising a solvent dispense head and a logic control unit capable of executing the process claimed. The bulk solvent container is capable of containing any solvent, including the claimed solvent. Orth as applied in claim 44 above discloses a rotatable base for mounting the wafer.

The admitted prior art discloses the first and second nozzle directed as claimed. Orth as applied in claim 46 above discloses a third nozzle directed toward the center of the wafer. The apparatus is capable of performing the intended process steps.

As to claim 59, the admitted prior art discloses that track coating unit comprises solenoids coupled to the logic control unit for controlling the flow through the nozzles (see Figure 1, items 131, 132, and specification page 9, lines 14-17.)

As to claim 60, the admitted prior art as modified by Orth is capable of including aliphatic ester in the bulk solvent.

As to claim 61, see the rejection of claim 44, 46 and 48 above. Claim 61 differs in that it omits the low pressure canister, and includes extra intended use steps directed toward spinning the wafer, edge bead removal and cleanup. The apparatus of the admitted prior art and Orth as applied in claims 44, 46 and 48 discloses the structure of claim 61.

Response to Arguments

14. In response to applicant's argument that the percentages of the solution provides patentability, or that method steps provide, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235

(CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). It is further noted that applicant is claiming *an apparatus*, which is capable of dispensing any *solution* desired. No hindsight reasoning is required, because the apparatus of Orth (and the other references) is disclosed as dispensing a variety of solutions, and is capable of dispensing a solution of the claimed ranges. The solution is not a part of the apparatus.

15. In response to applicant's argument that the third nozzle is intended to dispense solvent on the wafer, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

16. With respect to the argument that Orth and Gordon do not execute the logic control steps, it is noted that Orth discloses a logic control unit with the steps, albeit in a different order than that claimed, and Gordon discloses the steps in the order claimed. One performing the method of Gordon would be well advised to modify the logic control unit of Orth to perform the steps of Gordon for the benefits those steps provide.

Conclusion

17. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to George R. Koch III whose telephone number is (703) 305-3435 (TDD only). If the applicant cannot make a direct TDD-to-TDD call, the applicant can communicate by calling the Federal Relay Service at 1-800-877-8339 and giving the operator the above TDD number. The examiner can normally be reached on M-Th 10-7

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard D. Crispino can be reached on 703-308-3853. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

George R. Koch III
April 6, 2003

RICHARD CRISPINO
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700